Jan. 29, 1957 K. E. SCHULZE 2,779,356

METHOD OF TYING WIRE

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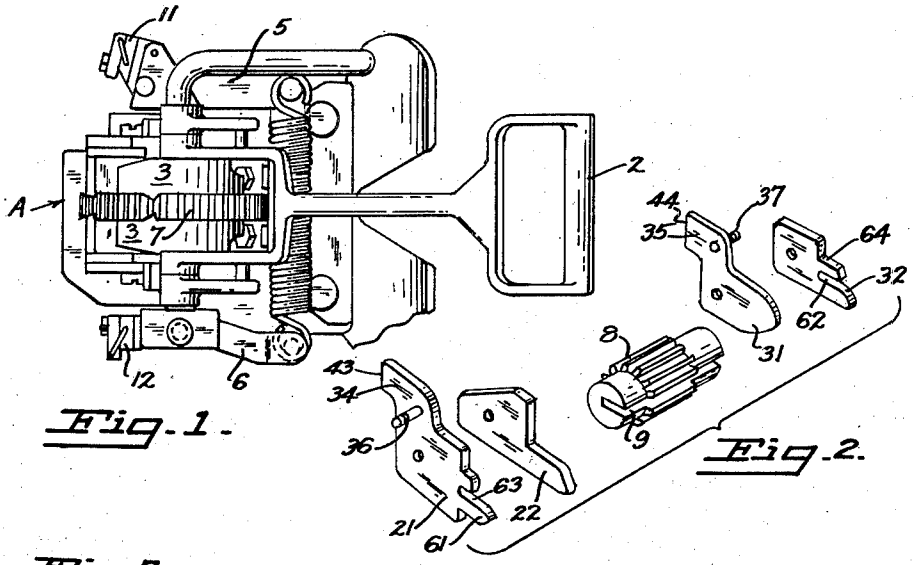


Fig. 1.

Fig. 2.

Fig. 7.

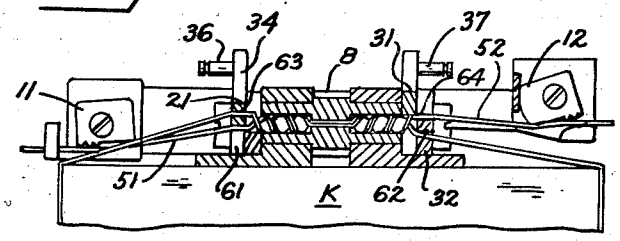


Fig. 8.

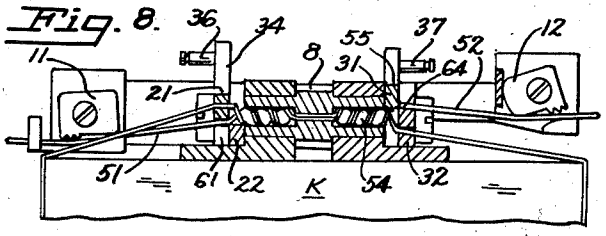
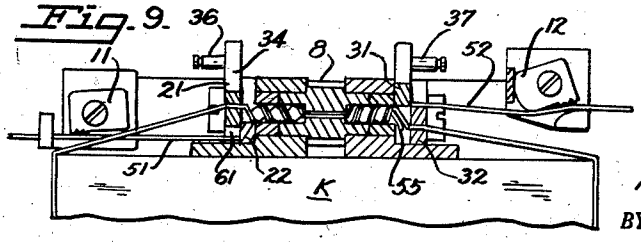


Fig. 9.



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Fig. 3.

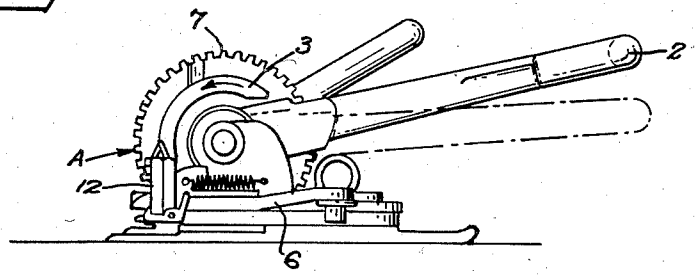
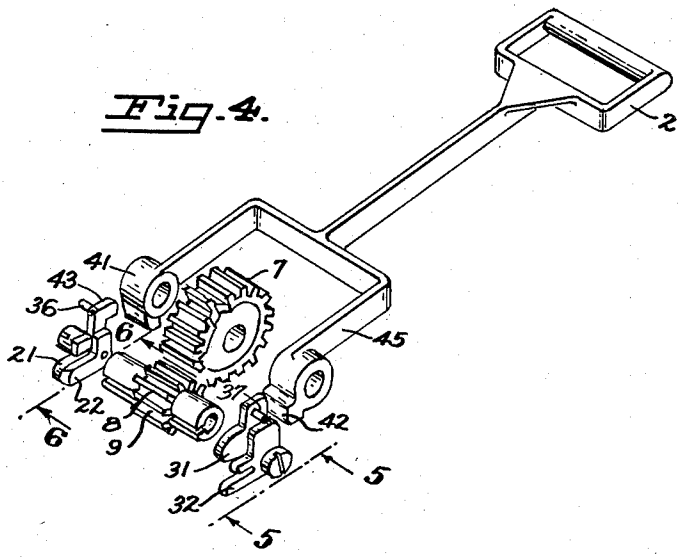


Fig. 4.



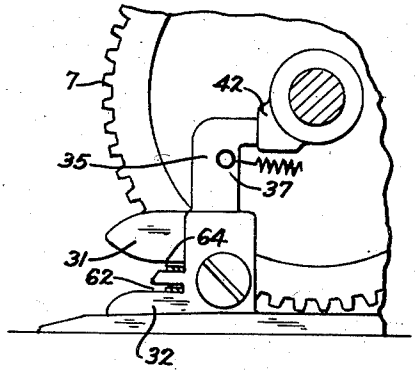


Fig. 5.

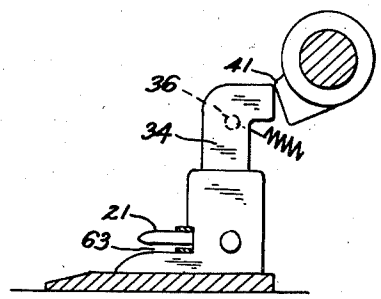


Fig. 6.

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2,779,356

METHOD OF TYING WIRE

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Original application November 29, 1948, Serial No. 62,554, now Patent No. 2,624,375, dated January 6, 1953. Divided and this application October 28, 1952, Serial No. 317,175

3 Claims. (Cl. 140—93)

This invention relates to a method of tying wire, and more particularly to a method designed to secure a flat wire or band around a box, package, bundle, or the like, to form a smooth tie.

A principal object of the present invention is to provide a method for tightening and securing a wire or band around a container, or the like, and particularly flat wire, by twisting the ends of a strand of said wire together to form a tie and wherein the jagged ends of said wire so twisted together to form a tie do not project above the tie but are disposed under the twisted portion of the wire and lie flat against and next to the object tied. Thus, persons handling a package tied with the wire are not injured by contact with the jagged ends of the wires. Further, the tie is securely fixed and thus secured is not affected by rough handling or impact with the jagged ends which might otherwise be the case if the sheared or jagged ends protruded above the tie.

The present invention is a division of my copending application Ser. No. 62,544, now Patent No. 2,624,375, which is a continuation in part of my United States Letters Patent No. 2,460,846, patented February 8, 1949.

In the drawings:

Fig. 1 is a top plan view of a wire tying machine useful in practicing my method.

Fig. 2 is an exploded view of the preferred form of wire cutting members, guide members and twisting gear in the machine of Fig. 1.

Fig. 3 is a side elevational view of the wire cutting machine of Fig. 1.

Fig. 4 is an exploded view of the preferred form of operating handle and associated parts.

Fig. 5 is a fragmentary side elevational view taken from line 5—5 of Fig. 4 of the main actuating gear and a portion of the operating handle mechanism partially in section and in association with the cutting and guide members.

Fig. 6 is a view, similar to Fig. 5, and taken from line 6—6 of Fig. 4 and omitting the main actuating gear and handle mechanism.

Fig. 7 is a front elevational view, partly in section, illustrating the function of the cutting, gripping and twisting elements and illustrating the tie prior to cutting an end of the wire being tied.

Fig. 8 is an illustration similar to Fig. 7 and illustrating the cutting action of the right hand cutting members.

Fig. 9 is a view similar to Figs. 7 and 8 and showing the completed tie and wherein the cut ends of the wires are disposed under the tie.

The machine useful in practicing the method may comprise any suitable structure of the general character disclosed in United States Letters Patent No. 1,545,407, issued July 7, 1925, to C. L. Drew et al., which comprises, generally, a portable tool constructed to rest on a package, or the like, to be strapped, and provided with means for twisting together the wire to form a tie, and means for cutting off the ends of the wire extending beyond the tie, and a single operating lever. Movement

of the lever from its normal position serves to tighten the wire and movement of the lever in a reverse direction serves to tie the wire and then cut the end portions thereof.

Essentially, the machine comprises an operating handle 2, adapted to be moved forwardly from the neutral position, indicated in Fig. 3, toward the tying end of the machine, indicated at A. Forward movement of the handle 2 causes cam 3 to rotate in the direction of the arrow (Fig. 3), thereby causing pivotally mounted arms 5 and 6 to move laterally away from the machine, which, when the wire is positioned properly in the machine, causes the wire to be tightened around the package to be tied. Movement of the handle 2 in a reverse direction causes rotation of the main actuating gear 7 which in turn imparts rotative movement to the wire twisting gear 8, provided with a wire receiving slot 9, which, when the wire is positioned properly in the machine, causes the tie to be formed by twisting together strands of wire positioned therein. Further movement of the handle 2 to the position shown in dotted lines in Fig. 1 actuates the wire cutting members.

The wire gripping means preferably comprises a left wire gripper 11 and a right gripper 12 of the type illustrated and described in my United States Letters Patent No. 2,580,848, although it is to be understood that any suitable grippers may be utilized with the present invention.

The cutter members and the guide members are preferably of the character disclosed in my United States Letters Patent No. 2,460,846, so far as the wire receiving portions thereof are concerned.

As illustrated herein, a left cutter member 21 is disposed adjacent to the left guide member 22 and a right cutter member 31 is disposed adjacent to a right guide member 32. As fully set forth in United States Letters Patent 2,460,846 heretofore mentioned, relative rocking movement of member 31 relative to member 32 produces a scissors action between adjacent said members to shear or cut the ends of wires disposed therein in cutting position.

As has been hereinabove pointed out, it is advantageous to position the sheared ends of the cut wire under the tie. With this end in view, a means is provided to shear one end of the wire disposed around the package to be tied before the other end is sheared; and in the interim between cutting the first end and prior to cutting the second end of said wire, the first sheared end is twisted to a position under the tie and then the second end is cut so that it is disposed below the tie thereby to provide a twisted wire tie wherein both of the sheared ends are disposed flat against and next to the surface of the object tied. Thus, a smooth wire tie is accomplished with no jagged portions of the wire projecting above the surface of the tie.

It is inherent in the type of wire tying machine under consideration, namely wire tying machines adapted particularly to handle flat wires or bands, that the wire cutting means must provide for the wires to be positioned in vertical alignment, whereby the end portions of a wire which lead to the grippers are retained in substantially vertical alignment with that part of the wire encircling the object to be tied. This result is accomplished by providing a plurality of wire receiving portions in one member of each pair of members which coact to guide and cut the ends of the wire. It is necessary to maintain the portions of the wire heretofore mentioned in substantial vertical alignment rather than place them side by side, as may be done when working with round wire, because of the fact that round wire may be bent in any direction without any greater or lesser degree of distortion or tension, whereas, obviously, flat wire, when bent in a lateral direction, i. e. in the direction of its greatest

width, causes serious distortion which may result in rupture and weakening of the wire. It follows from the type of wire guide and cutter members utilized in the present invention that one end of the wire to be cut after formation of the tie would be disposed above or at least at the horizontal level of the top of the tie while the opposite end would be disposed under the tie.

The present invention provides a method of tying wire in order to cut one end of the wire and then twist the cut end under the tie, at which time the other end is cut, thereby positioning both cut ends below the said tie.

The movable members or cutter members **21** and **31** are each provided with a rearwardly extending shank **34** and **35** and stops **36** and **37**, respectively. The shanks **34** and **35** terminate in strike portions **43** and **44** which are arranged to contact pads **42** and **41**, respectively. The pads are carried by the clevis portion **45** of handle member **2**, and which said clevis straddles the cam **3** and main actuating gear **7** and the said pads are in operative alignment with the said strike portions **43** and **44** so that when the handle is operated to the dotted line position shown in Fig. 3 the pads thereupon urge members **21** and **31** forwardly to cut the ends of the wire disposed in the wire receiving portions thereof. The pad **42** (see Figs. 5 and 6) is enlarged or extended forwardly relative to pad **41** (Fig. 6) so that pad **42** contacts the shank **35** of member **31** before pad **41** contacts the strike portion of shank **34** of member **21**. Pad **42** urges said member **35** forwardly to operative cutting position before pad **41** is in operative contact with the shank **44** of member **21**. Thus, the end of the wire to be sheared by member **35** is cut before operative cutting movement occurs with respect to member **21**.

It is obvious that rather than to provide for different relative sized pads **41** and **42** it may be desirable simply to extend shank **35** rearwardly further than shank **34** so that pads of equal size, carried by the clevis **45**, will contact an enlarged shank **35** before contacting a relatively smaller shank **34** in order to urge member **31** forwardly before member **21** is urged forwardly.

Referring now to Figs. 2, 7, 8 and 9, the end **51** of the wire which leads from the left hand gripper **11** is disposed in the lowermost wire receiving portion of slot **61** of member **21**. This portion **61** may be termed the wire cutting portion. The end of the wire **51** disposed in wire receiving portion **61** is then fed through member **22**, thence through the slotted gear **9**, thence below member **31** through wire receiving portion or slot **62** of member **32** around the article to be tied, indicated generally at K. The wire receiving portion **62** of member **32** may be referred to as the guide portion of said member **32**.

After encircling the article K, the wire is then led through wire receiving portion or slot **63** of member **21**, which said portion may be referred to as the guide portion of member **21**, thence through members **22** and **9** under member **31** and through wire receiving portion or slot **64** of member **32**. The wire receiving portion **64** may be referred to as the wire cutting portion of member **32**. The end **52** of the wire passing over portion **64** is then led to the gripper **12**.

Thus, it is seen that the ends **51** and **52**, which are to be cut, are disposed through the cutting portions of the members having a plurality of wire receiving portions, and the wire **52**, before it is cut (Fig. 7), occupies a position above the part of the wire strand which encircles the object K, i. e. it lies atop the tie and not thereunder.

Fig. 8 indicates the position of the parts after end **52** has been cut but prior to cutting of end **51**. After end **52** has been severed by the movement of member **31**, the twisted portion of the tie on the right side of the machine, indicated at **54**, is enabled to rotate upon rotation of the gear **9** to thus place the sheared end portion **55** of the wire under the twisted portion **54** of the wire by the time member **21** has been actuated to cut wire end **51**.

Fig. 9 illustrates the portions of the sheared wire ends at the completion of the tie. It is noted that movement of the operating handle and associated parts causes rotation of the gear **9** during the interim between actuation of member **31** through contact with pad **42** and movement of member **21** through contact with pad **41**, and thus, the severed end **55** is rotated 180° from the position of Figs. 7 and 8 to the position of Fig. 9, as aforesaid.

I claim:

1. The method of tying a package with flat wire comprising providing a suitable length of flat wire, gripping said wire at a first point remote from a first end thereof, passing said first end around said package, placing said first end on top of and overlapping the length of said wire adjacent said first point, gripping said wire at a second point adjacent its first end, twisting said overlapped portions of said wire in a plurality of turns to form a tie while maintaining said first end on top, cutting the excess from said first end, continuing rotation of said tie 180° until the remaining end from which said excess was severed is tucked under said tie, and severing said wire between said first point and said tie.

2. The method of tying flat wire which comprises looping the wire around an object to be tied, positioning the free end of the wire over and flat against the remaining wire in overlapped relation, twisting the overlapped portions of the wire a plurality of turns, cutting off the excess of the free end of said wire, twisting the wire an additional 180 degrees to tuck the cut end under said tie and cutting off a second end of the wire at a position under said tie whereby both the cut ends of the wire are disposed under the twisted portion of the wire.

3. The method of tying wire which comprises encircling the object to be tied with a loop of wire, maintaining the free end portion of the wire in substantially vertical alignment with that part of the wire encircling the object to be tied with said end portion above said encircling portion, maintaining the other end portion of the wire in substantially vertical alignment with that part of the wire encircling the object to be tied with the end portion below said encircling portion, twisting said free end of the wire a plurality of turns, cutting the first mentioned end of said wire above the tie, additionally twisting the overlapped portions of the wire an additional 180 degrees to a position under the tie and cutting off the second mentioned end of the wire at a position under the tie whereby both the cut ends of the wire are disposed under the twisted portion of the wire.

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